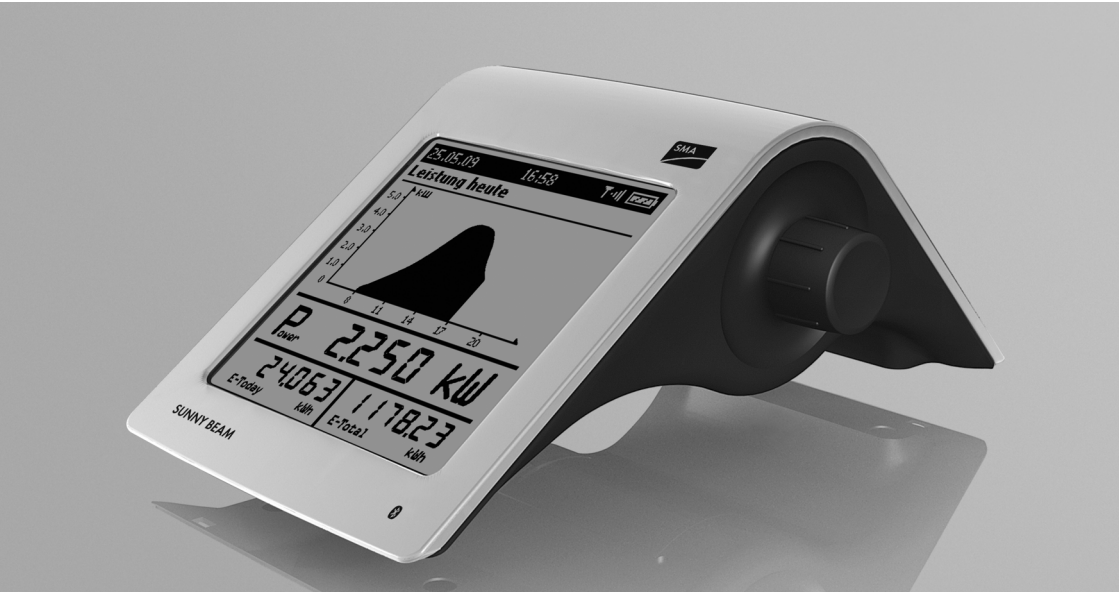
Device for plant monitoring

SUNNY BEAM with *Bluetooth*® Wireless Technology

User Manual



BeamBT11-eng-BA-BUS113213 | 98-0011113 | Version 1.3

CA US

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SMA America, LLC
3801 N. Havana Street
Denver, CO 80239 U.S.A.

SMA Solar Technology Canada Inc.
2425 Matheson Blvd. E
8th Floor
Mississauga, ON L4W 5K5
Canada

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions for the following products:

- Sunny Beam with *Bluetooth*® Wireless Technology

This manual must be followed during installation and maintenance.

The product is designed and tested according to international safety requirements, but as with all electrical and electronic equipment, certain precautions must be observed when installing and/or operating the product. To reduce the risk of personal injury and to ensure the safe installation and operation of the product, you must carefully read and follow all instructions, cautions and warnings in this manual.

Warnings in this document

A warning describes a hazard to equipment or personnel. It calls attention to a procedure or practice, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the SMA equipment and/or other equipment connected to the SMA equipment or personal injury.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to personal injury.

Other Symbols in this document

In addition to the safety and hazard symbols described on the previous pages, the following symbols are also used in this manual:

Symbol	Explanation
i	Indicates information that is important for a specific topic or objective, but is not safety-relevant.
☐	Indicates a requirement for meeting a specific goal.
☑	Desired result.
✖	Undesired result. Followed by a solution on how to achieve the desired result.

General Warnings

⚠ WARNING

General Warnings

All electrical installations must be done in accordance with the local and *National Electrical Code*® ANSI/NFPA 70 or the *Canadian Electrical Code*® CSA C22.1. This document does not and is not intended to replace any local, state, provincial, federal or national laws, regulation or codes applicable to the installation and use of the product, including without limitation applicable electrical safety codes. All installations must conform with the laws, regulations, codes and standards applicable in the jurisdiction of installation. SMA assumes no responsibility for the compliance or noncompliance with such laws or codes in connection with the installation of the product.

The product contains no user-serviceable parts. For all repair and maintenance, always return the unit to an authorized SMA Service Center.

Before installing or using the product, read all of the instructions, cautions, and warnings in this manual.

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1 Information on this Manual

Validity

This manual is valid for the "Sunny Beam with *Bluetooth*" type BEAM-BT-11.GR1. You can read the type designation on the type label on the underside of the Sunny Beam with *Bluetooth*.

This manual contains instructions for operating the Sunny Beam with *Bluetooth*. Keep this manual in a convenient place for future reference. This manual does not contain any detailed information about the connected devices. Detailed information about the connected devices is provided in the manuals for the devices.

Target group

This manual is intended for the operator and the installer. Certain section headings are marked with the additional specification "(Installer)". The tasks described in these sections may only be performed by electrically qualified persons. An electrically qualified person has received training and has demonstrated skills and knowledge regarding the functions and operation of the device. An electrically qualified person is trained to deal with the dangers and hazards involved in installing electrical systems.

Additional Information

Additional information is available at www.SMA-America.com.

Document title	Document type
CO_2 Factor	Technical Information
SMA *Bluetooth* Wireless Technology	Technical description
SMA *Bluetooth* Wireless Technology in Practice	Technical Information

Typography

Typography	Explanation	Example
"light"	Designates elements in a software user interface or on a display or mentions device connections.	• The value can be read in the "Energy" field.
bold	Designates elements that can be selected or entered in a software user interface or on a display.	• Select **Settings**. • Enter **10** in the "Minutes" field.
>	Designates multiple elements that should be selected in a software user interface or on a display.	• Select **Settings > Date**.
[Button/key]	Designates buttons or keys that should be selected or pressed.	• Select [Next].

Nomenclature

The following nomenclature is used in this manual:

Term	Designation in this manual
SMA America Production, LLC	SMA
SMA Solar Technology Canada Inc.	SMA
SMA *Bluetooth*® Wireless Technology	SMA *Bluetooth*
Sunny Beam with *Bluetooth* Wireless Technology	Sunny Beam
SMA *Bluetooth* Piggy-Back Plus	SMA *Bluetooth* Piggy-Back
SMA *Bluetooth* Repeater Outdoor	SMA *Bluetooth* Repeater
PV plant	Plant
Small wind turbine system	Plant

Abbreviations

Abbreviation	Description	Explanation
PV	Photovoltaics	–

2 Safety

Intended use

The Sunny Beam is only suitable for indoor use. The Sunny Beam must only be used with original accessories from SMA or accessories recommended by SMA.

NOTICE

Damage to Sunny Beam caused by leaking batteries

Batteries of the wrong type may leak into the Sunny Beam and damage the device.

- Do not use any batteries.
- You must only use rechargeable nickel-metal hydride batteries (NiMH), type Mignon (AA) with low self discharge, e.g. Eneloop batteries (see section 12 "Accessories", page 89).

Damage to the Sunny Beam due to batteries with different states of charge

- Batteries with different states of charge may damage the Sunny Beam. Use and replace the rechargeable batteries in pairs.

The Sunny Beam data is not suitable for billing purposes. Data collected by the Sunny Beam regarding the power generated by your PV plant may deviate from the electricity meter data.

3 Sunny Beam with *Bluetooth*

3.1 Use and Function

The Sunny Beam is a communication device which queries, displays, and stores data from up to 12 inverters from SMA. Communication with the inverters takes place via *Bluetooth*. The Sunny Beam always establishes a direct connection to only one device. Using this device, the Sunny Beam has a connection to the other devices of the plant.

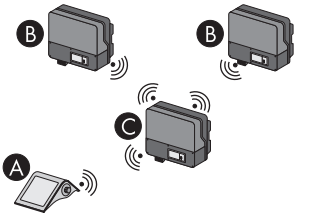


Figure1: Communication principle between the Sunny Beam and three inverters (example)

Position	Designation
A	Sunny Beam
B	Inverter
C	Inverter to which the Sunny Beam connects directly

Functions

- Display of faults and warnings
- Acoustic alarm in the event of faults in the plant and critical state of charge of the battery
- Filing of plant data in CSV files for at least 90 days for storing on the computer
- Graphical display of the following data for the whole system and for each inverter:
  - Performance today/performance yesterday
  - Energy for the last 31 days/energy for the last 12 months
  - Specific annual yield for the complete plant
  - Feed-in tariff for the current day/feed-in tariff for the total runtime of the plant
  - CO_2 avoided for the current day/CO_2 avoided for the total runtime of the plant
- Display of the following data for the entire system and for individual inverters:
  - Current AC power (Power)
  - Daily yield for today (E-Today)
  - Daily yield for yesterday (E-Yday)
  - Total energy yield (E-Total)

3.2 Supported Products

The Sunny Beam can establish a connection to the following products from SMA.

- All SMA inverters with SMA *Bluetooth* Piggy-Back installed* or SMA *Bluetooth* Piggy-Back Plus installed** from firmware version 02.00.03.R.
- SMA PV inverter with integrated *Bluetooth*:
  - Sunny Boy 2000HF-US (SB 2000HFUS-30)
  - Sunny Boy 2500HF-US (SB 2500HFUS-30)
  - Sunny Boy 3000HF-US (SB 3000HFUS-30)
- Devices with repeater function:
  - SMA *Bluetooth* Repeater
  - SMA Power Injector with *Bluetooth*

* A list of supported inverters can be found in the SMA *Bluetooth* Piggy-Back installation manual.

** A list of supported inverters can be found in the SMA *Bluetooth* Piggy-Back Plus installation manual.

3.3 Device Overview

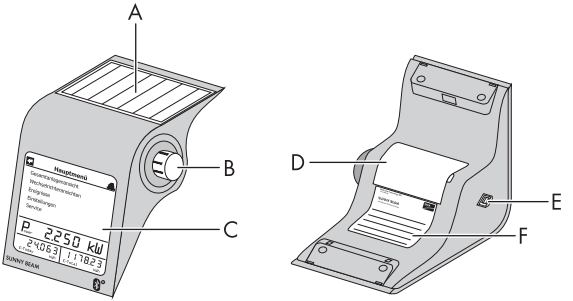


Figure 2: Device Overview

Position	Designation
A	PV cell
B	Control button
C	Display
D	Battery compartment
E	USB port
F	Type Label

3.4 Scope of Delivery

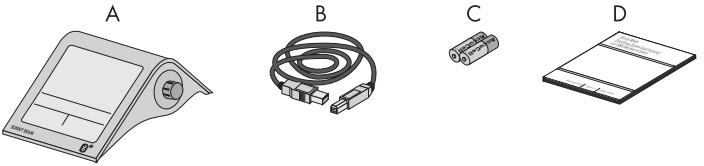


Figure 3: Scope of Delivery

Position	Quantity	Designation
A	1	Sunny Beam with *Bluetooth* Wireless Technology
B	1	USB connection cable
C	2	Nickel-metal hydride batteries (NiMH), type Mignon (AA) with low self discharge
D	1	User manual

4 Commissioning (Installer)

4.1 Commissioning the Sunny Beam

For PV plants with one inverter, NetID 1 is possible

You may keep the default NetID set to 1 in your inverter upon delivery if your *Bluetooth* PV plant consists of the following products:

- A maximum of one inverter
- A maximum of one computer with *Bluetooth* and Sunny Explorer software
- A maximum of one Sunny Beam of the type BEAM-BT-11.GR1

or

- A maximum of one inverter
- A maximum of two Sunny Beams of the type BEAM-BT-11.GR1

In all other cases you must determine a free NetID (see Sunny Explorer Help).

Requirements:

☐ You have detected a free NetID using Sunny Explorer, also at the planned installation location of the Sunny Beam (see Sunny Explorer help).

☐ You have configured the same free NetID for all devices.

☐ You have started all the devices in the plant.

☐ Using the Sunny Explorer, you have changed the plant passwords configured upon delivery (see Sunny Explorer help). All inverters have the same plant password for "User". All inverters have the same plant password for "Installer". The plant passwords for "User" and "Installer" are different.

☐ For plants with inverters with SMA *Bluetooth* Piggy-Back or SMA *Bluetooth* Piggy-Back Plus: All inverters feed in.

Prior to commissioning, familiarize yourself with the operating principle of the Sunny Beam (see section 5.1).

Sunny Beam will guide you through the commissioning procedure. After commissioning, configure the first settings in the Sunny Beam (see section 6.2).

Procedure:

- Configure the basic settings
- Search for your plant
- Setting the plant time and plant power

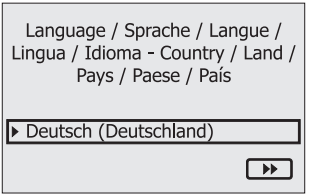
Configure the basic settings

1. Open the underside of the battery compartment.
2. Insert rechargeable batteries into the battery compartment. For this purpose, observe the marking in the battery compartment. Tip: You do not have to charge the batteries in advance. Sunny Beam charges the batteries using a PV cell.
3. Close the battery compartment.

   ☑ The start screen appears.

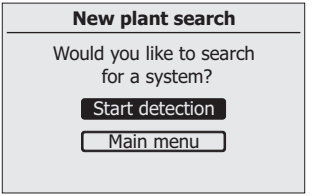
4. Press the control button.

   ☑ The page for setting the language and the country appears.



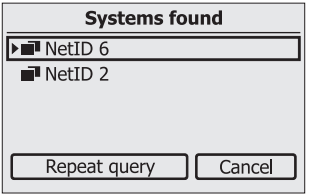
5. To change the language and the country, select **Deutsch (Deutschland)** and set the desired language and the desired country.
6. Select [>>].

   ☑ "New plant search" appears.

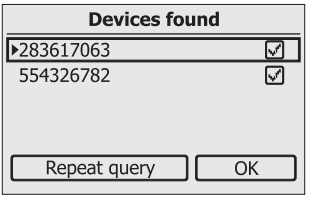


Search for your plant

1. Set up the Sunny Beam at the intended installation location (see section 4.3).
2. Select [Search now].
   ☑ The plant search will start.
   ☑ "Plants found" appears. The NetID of your plant is shown.
   ✖ Is the NetID of your plant not shown?
   • See section 10.
3. Select the NetID of your plant.



   ☑ "Establish connection" appears. Sunny Beam establishes a connection to the inverters and to the devices with repeater function* .
   ☑ "Devices found" appears. The serial numbers of all your inverters are listed.
   ✖ Are not all of your inverters listed or are other inverters listed?
   • See section 10.



4. If the plant consists of more than 12 inverters, select 12 inverters that are to be managed by the Sunny Beam. For this purpose, deactivate the selection fields of the inverters that are not to be managed by the Sunny Beam.

* SMA *Bluetooth* Repeater, SMA *Bluetooth* Repeater Outdoor, SMA Power Injector with *Bluetooth*

5. Select [OK].

   ☑ "Data administration" appears.

6. On the "Data administration" page, you do not need to configure any settings if the Sunny Beam is being commissioned for the first time. If a plant has already been detected by the Sunny Beam and data has already been requested, see section 6.10.

7. Select [>>].

   ☑ "Establish connection" appears. Sunny Beam establishes a connection to the inverters and devices with repeater function* and requests data.

   ☑ "Connected devices" appears. Inverters and devices with repeater function* ( ) are listed. All devices are marked with a lock.

   ✖ Are not all devices marked with a lock?

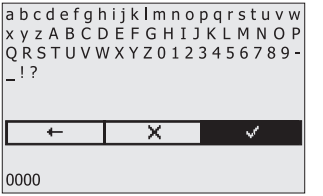
   - See section 10.

* SMA *Bluetooth* Repeater, SMA *Bluetooth* Repeater Outdoor, SMA Power Injector with *Bluetooth*

8. Set the plant password configured for the plant for the user group "User":
   - Select [Plant password].

   ☑ The input page appears.

   - Select the arrow [←] until the plant password (0000) at the bottom of the display has been deleted.
   - Select the desired characters one after another.
   - To cancel the entry, select the cross [✕].
   - Select the checkmark [✓]. In this way, you save the entered plant password.



   ☑ "Connected devices" appears. All devices are marked with a checkmark.

   ✖ Are not all devices marked with a checkmark?

   - See section 10 "Troubleshooting", page 77.

9. Select [OK].

   ☑ "Time zone" appears.

Setting the plant time and plant power

1. Select **+1 - Berlin, Rome, Paris, Madrid** and set the desired time zone.
2. Select [>>].
   ☑ "Time and date" appears.
3. Select **Date** and set the current date.
4. To switch to daylight saving time, select **Daylight saving time**.
5. Select **Time** and set the current time.
6. Select [>>].
   ☑ "Plant power" appears.
7. Select **Plant power in kWp** and set the plant power of the plant in kWp.
8. Select [>>].

☑ "Power today" appears. Sunny Beam is ready for operation. Sunny Beam loads the plant data in the background. This process can take several minutes. During this time, you can change the chart views.

4.2 Notifying the Plant Owner of the new NetID and Plant Password

Notify the plant owner of the following data:

- NetID of the plant
- Plant password for "User"

4.3 Installing the Sunny Beam

Installation location requirements:

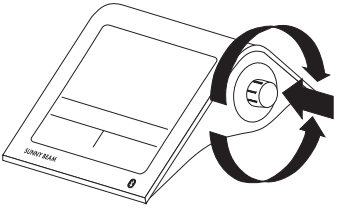
- ☐ The installation location is indoors. Tip: Select a location that is exposed to sunlight if possible. As a result, the Sunny Beam can optimally charge the batteries using its integrated PV cell.
- ☐ Ambient temperature is always between +32°F and +104°F (0°C und + 40°C).
- ☐ The installation location is protected against dust, moisture, and corrosive substances.
- ☐ Devices that use the 2.4 GHz frequency band (e.g. Wi-Fi devices, microwave ovens) keep a minimum distance of 3 ft. (1 m). This will prevent reduced connection quality and decreased data transmission speed.
- ☐ Connection quality is at least "good".

1. Set up the Sunny Beam at its intended installation location.
2. Check the connection quality (see section 6.13).

5 Operation

5.1 Operating the Sunny Beam

- You operate the Sunny Beam using the control button that can be turned and pressed.



Moving the Selection Frame

The selection frame indicates which menu item is currently selected.

- By turning the push button, you can move the selection frame to the next menu item or the previous menu item.
  - ☑ If you move the selection frame on a button, the display of the button is dark. The selection frame can no longer be seen.

Selecting a Menu Item, Setting Values

When the selection frame is placed over a menu item, you may open the menu item by pressing the push button. When you have opened a menu item with a colon, you can set the values by turning the button.

5.2 Display Layout

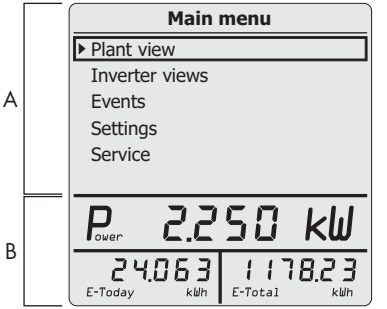


Figure 4: Display Layout

Position	Explanation
A	Area for menu and charts
B	Power and energy display

5.3 Explanation of the Menu

Using the menu, you can configure settings and access plant data.

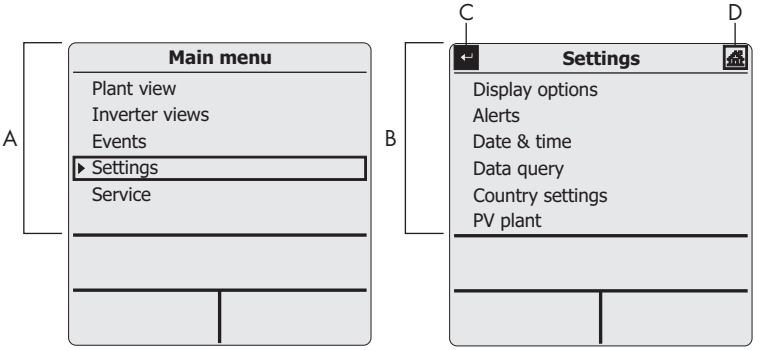


Figure 5: "Settings" main menu and sub-menu (example)

Position	Symbol	Explanation
A		Main menu
B		Sub-menu (example "Settings")
C		Navigate backward in the menu
D		Accessing the main menu

5.4 Power and Energy Display

The power and energy display shows value for the complete plant or for an individual inverter. If the Plant view is opened, the values apply to the complete plant. If the Inverter view is opened, the values apply to the selected inverter (see section 5.5).

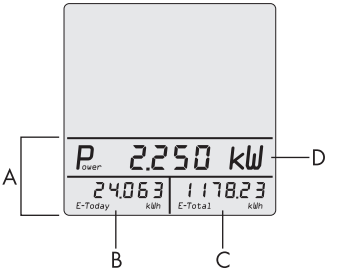


Figure 6: Power and energy display (example)

Position	Designation	Significance
A	Power and energy display	
B	E-Today	Energy today
	E-Yday*	Energy yesterday
C	E-Total**	Overall energy
D	Power**	Current AC power

* If the "Power yesterday" chart is opened.

** If the "Energy today" chart is opened, the Sunny Beam queries the current power (Power) and total energy (E-Total). Sunny Beam hides the value "Power" after 60 seconds, as the value is no longer up to date.

5.5 Chart Views

5.5.1 Charts Displayed

The Sunny Beam graphically displays the data of the complete plant and each inverter.

Chart	Data Displayed
Power today	• Area chart with the course of the power for the current day
Power yesterday	• Area chart with the course of the power for the previous day
Yield of the last 31 days	• Bar chart with the energy yields of the last 31 days
Yields of the last 12 months	• Bar chart with the energy yields of the last 12 months
CO_2 avoided	• CO_2 avoided for the current day • CO_2 avoided for the total runtime of the plant*
Revenue	• Revenue for current day • Revenue for the runtime of the plant*
Specific annual yield	• Bar chart with the specific annual yield of the complete plant for the total runtime of the plant*

* Data quantity depends on when the plant was detected for the first time using the Sunny Beam.

Display of Measured and Calculated Values in Diagrams

The Sunny Beam displays complete data in the diagrams in black. The Sunny Beam calculates incomplete data and displays these in gray. Data may be incomplete for the following reasons:

- There are no complete data for the time period, as the plant was only commissioned during this time period.
- In the meantime, the Sunny Beam is not connected to the plant in the time period. As a result, the Sunny Beam could not query any data from the inverters. In this case, the Sunny Beam regularly attempts to request the missing data from the inverters.
- There are not yet any data available for the time period, as the time period has not yet been completed.

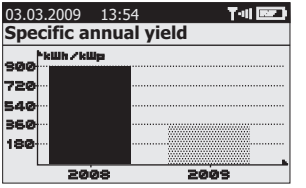


Figure 7: Gray bar for the current year that has not yet been completed (example "2009")

5.5.2 Accessing the Plant View

The plant view displays the data of the complete plant.

1. In the main menu, select **Plant view**.
   ☑ The "Power today" chart appears.
2. To access the next chart, turn the control button in any direction.
3. To access the next chart, turn the control button in the same direction.
4. To access the previous graphic, turn the control button in the opposite direction.

5.5.3 Accessing the Inverter View

The inverter view graphically displays the data of each individual inverter.

1. In the main menu, select **Inverter views**.
   ☑ "Inverter views" appears.
2. Select the desired inverter.
   ☑ The "Power today" chart appears.
3. To access the next chart, turn the control button in any direction.

5.5.4 Symbols in the Chart View

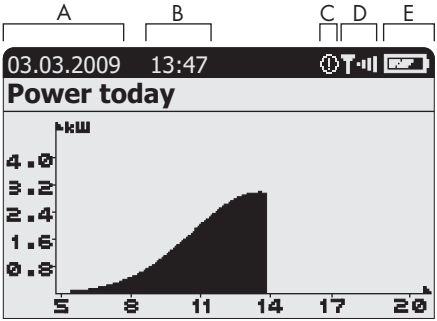


Figure 8: "Power today" chart view (example)

Position	Symbol	Significance
A		Date
B		Time
C*		The "Information" event has occurred and is unread
		The event "Warning" has occurred and is unread
		The event "Error" has occurred and is unread

* The "Information" and "Warning" events count as read as soon as the "Events" menu is accessed. Sunny Beam no longer shows the symbol in the display. The "Error" event only counts as read as soon as the "Events" menu is accessed.

Position	Symbol	Significance
D*		Very good connection
		Good connection
		Unreliable connection
		Critical connection
		No connection
		Establish connection
E**		Battery is fully charged
		Battery is no longer fully charged
		Battery is fully discharged

* Sunny Beam only shows the symbol in the chart view.

** If you charge the batteries in the Sunny Beam using the computer or the USB plug-in power supply, the battery symbol is animated.

5.6 Accessing and Reading Events

The Sunny Beam reports the following events:

Device	Event
Inverter	Information, warning, error
Sunny Beam	Information, if the Sunny Beam is not connected to a device.

The Sunny Beam shows unread events as symbols in the chart view (see section 5.5.4).
The Sunny Beam additionally reports errors through a signal tone. Terminated errors or warnings are changed to the event "Information".

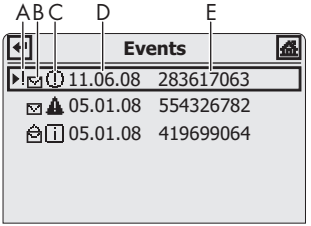


Figure 9: Events menu (example)

Position	Symbol	Significance
A	!	Event is still present
B		Read event
		Unread event

Position	Symbol	Significance
C		"Information" event This event is displayed, for example, if a warning is terminated.
		"Warning" event This event is displayed, for example, if an error may occur in the inverter in the foreseeable future, e.g. in the event of frequent grid overvoltage.
		"Error" event This event is displayed if the inverter requires external help in order to function correctly. Access the details about this event.
D		Date of the event
E		Name or serial number of the inverter to which the event applies.

Details About the Events:

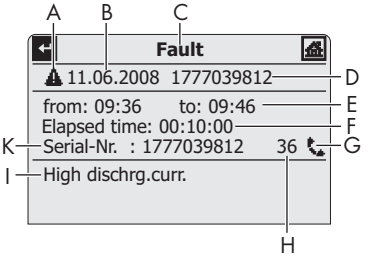


Figure 10: Details of a selected event (example, "Error" event)

Position	Significance
A	Symbol of the respective event
B	Date of the event
C	Name of the respective event
D	Name or serial number of the inverter where the event occurred.
E	Time of the event. • "Since:" = Start time of the event. The event has not yet ended or the end time is not known. • "From: Until:" = Start time to end time of the event. The event has ended. • "Until:" = End time of the event. The event has ended and the start time is unknown.

Position	Significance
F	Duration of the event: • Stated in the format "Hours: Minutes: Seconds". • "–:–:–" = Event has not yet ended or the duration cannot be calculated, as the start time or the end time are not known.
G	Symbols of the "Error" event: = Contact installer (installer is to contact SMA Service Line) = Contact installer
H	Event number* In the installation manual of the inverter in which the event has occurred, you can find a detailed rectifying measure via the event number.
I	The error message of the inverter and rectifying measure are displayed one after another.
K	Serial number of the inverter where the event occurred.

* For an inverter with integrated SMA *Bluetooth*, the event number is also shown on its display.

1. Select **Events**.
2. In order to access details of the event, select the desired event.
3. If the "Error" event is displayed, contact the installer and notify him/her of the event number (H) and serial number (K).

5.7 Storing Plant Data on the Computer

The plant data stored in the Sunny Beam can be stored on your computer as CSV files. The CSV files can be opened in e.g. Microsoft Excel and the data can be used to create diagrams.

The Sunny Beam stores the plant data for at least 90 days. The storage volume depends on the number of inverters. Once the memory is full, the Sunny Beam overwrites the old plant data from its memory.

The Sunny Beam stores the following plant data in CSV files:

File name*	Explanation	Values Contained
YY-MM-DD.CSV Example: 10-07-15.CSV	**Day file** A file for every day	• Power of individual inverters for this day. A value in kW is stored every 10 minutes • Total energy of individual inverters for this day in kWh • Previously generated total energy of the individual inverters in kWh
YYYY-MM.CSV Example: 2010-11.CSV	**Monthly file** A file for every month	• Total energy of individual inverters for every day of the month in kWh
ERROROBJ.CSV	**Event file**	• Errors and warnings of all inverters

* YY = last 2 digits of the year, YYYY = year, MM = month, TT = day

Inverters with SMA *Bluetooth* Piggy-Back

For inverters with integrated SMA *Bluetooth* Piggy-Back, it can take as long as until noon the next day, before the Sunny Beam can save the CSV files.

The decimal separator and the timestamp format in the CSV files are determined by the settings in the Sunny Beam.

Requirement:

☐ The operating system of the computer is supported by the Sunny Beam (see section 11).

1. Connect the Sunny Beam to the computer using the USB connection cable.
   ☑ The message stating that the Sunny Beam is updating the data is shown briefly.
   ☑ The computer detects the Sunny Beam like a removable media device. Two new drives are added to the computer.
2. Open the drive "SBEAM" and the folder "SBEAM".
3. Copy the CSV files of the folder "SBEAM" onto the computer.
4. Remove the Sunny Beam using the "Safely Remove Hardware" icon in the task bar of the computer.
5. Unplug the USB connection cable from the computer and the Sunny Beam.

6 Settings

6.1 Menu Overview

Plant view				
Inverter views				
Events				
Settings	Display options	Contrast	Upper contrast Lower contrast	
		Display off after		
		Balance factors	Revenue/kWh	Complete plant "Inverter"
			CO_2/kWh	
	Alarm	Signal tone every		
	Date & time	Date		
		Daylight saving time		
		Time		
		Time zone		
	Data Query	Data query every		
		Nighttime deactivation	Active	
	Country settings	Country		
		Language		
		Currency		
		CO_2 avoided		
		Formats	Decimal separator Date format Timestamp format	
	PV plant	Connected devices		
		New plant search		
		Changing the Device Name		
		Offset energy meter		
		Plant power in kWp		

Service	Diagnostics	Connection quality	
		Device information	Sunny Beam "Inverter"
	Update		
	Factory setting		

6.2 Initial Settings

6.2.1 Changing the Device Name

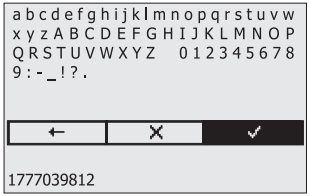
You can change the names of the detected inverters displayed in the Sunny Beam. The Sunny Beam displays the serial number or a previously assigned device name as the device name for the inverter. Device names, for example, can already be changed using the Sunny Explorer or the Sunny WebBox with *Bluetooth*. The Sunny Beam does not display a previously assigned device name if the device name contains characters that are unknown to the Sunny Beam. An overview of the characters that the Sunny Beam can display can be read in the Sunny Beam on the input page for the device name.

You can assign individual device names in the Sunny Beam. These device names only apply for the Sunny Beam and are not transferred to other devices. You can change the serial number to a representative device name. As a result, you can better distinguish between the inverters in the Sunny Beam.

1. Select **Settings > PV plant > Change device name**.
   ☑ "Change device name" appears.

2. Select the serial number or a previously assigned device name.

   ☑ The input page appears.



3. Select the arrow [←] until the previous device name has been deleted from the bottom of the display.
4. To cancel the entry, select the cross [✕].
5. Enter the desired device names:
   - Turn the control button until the desired character has been highlighted. For this purpose, avoid using umlauts as these characters cannot be displayed correctly in the CSV files.
   - Press the button.

   ☑ The selected character is shown at the bottom of the display.

   - Repeat the steps until the desired device name has been entered.
6. Select the checkmark [✓]. In this way, you save the entered device name.

6.2.2 Setting the CO_2 Factor for Calculating the CO_2 Savings Factor

The CO_2 factor* for calculating the CO_2 saved depends on the fuel mix of the location of the plant. You can find out how high the CO_2 factor of the location is by asking your electric utility company.

1. Select **Settings > Display options > Factors of balance > CO2 / kWh**.
2. Set the CO_2 factor.

6.2.3 Deactivating Overnight Shutdown for Wind Inverters

If you use wind inverters, you must deactivate the overnight shutdown of the Sunny Beam. As a result, the Sunny Beam also queries data from the wind inverters at night. The overnight shutdown is activated by default.

1. Select **Settings > Data query > Overnight shutdown**.
2. To deactivate overnight shutdown, deactivate the selection field "active". Tip: To prevent electric discharge of the batteries with deactivated overnight shutdown, connect the Sunny Beam to the power supply at night (section 8.1.1).

6.2.4 Setting Plant Power in kWp

If no value for plant power in kWp was set when the Sunny Beam was commissioned, you can subsequently set the value. The default setting is 0.00 kWp.

* For further information on the CO_2 factor, see section 1.

Importance of Plant Power in kWp and Specific Annual Yield

The plant power in kWp (kilowatt peak) is the maximum possible power of the plant. The Sunny Beam requires the system power in kWp to calculate the specific annual yield (kWh/kWp). The specific annual yield makes it possible to directly compare PV plants of different sizes. The calculated specific annual yield indicates the energy yield for the plant size per 1 kWp of power installed.

The Sunny Beam displays the specific annual yield in the Plant view. The Sunny Beam can display the specific annual yield for the last 31 years. For a new detection of a plant, the specific annual yield of the last 20 years is displayed. The more years are included, the narrower the columns in the chart will be.

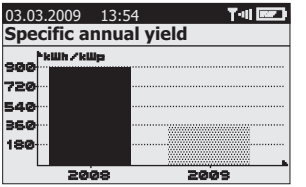


Figure 11: "Specific annual yield" chart in the plant view (example)

Requires data from January to December

The specific annual yield for one year is only representative if the Sunny Beam can use data for an entire year. If your plant was commissioned in July, for instance, there is no data from the previous months. The present data (from July to December) will then be projected to the entire year by the Sunny Beam. If the data for at least 330 days (= 11 months) of a year are not present, the Sunny Beam displays the columns in gray.

Automatic Calculation of the Specific Annual Yield in the Sunny Beam

The Sunny Beam calculates the specific annual yield as follows:

$$\frac{\text{kWh (kilowatt-hour)}}{\text{kWp (kilowatt peak)}} = \text{specific annual yield}$$

The value for kWh is calculated as follows:

$$\frac{\text{total daily energy values}}{\text{number daily energy values}} \times 365 \text{ days} = \text{value for kWh}$$

Example

Formula if the daily energy values for 250 days of a year are present:

$$\frac{\text{(e-day 1) + (e-day 2) + (e-day ...) + (e-day 250)}}{\text{250 days}} \times 365 \text{ days} = \text{value for kWh}$$

1. Select **Settings > PV Plant > Plant Power in kWp**.
2. Set plant power in kWp.

6.3 Adjusting the Display Contrast

1. Select **Settings > Display options > Contrast**.
2. Select **Upper contrast** or **Lower contrast**.
3. Set the contrast.

6.4 Adjusting the Display Deactivation

To save energy, the Sunny Beam can deactivate its display at night. Display deactivation takes place after 1 minute by default. You can adjust the interval until display deactivation or set the display to always remain switched on (setting "- - -").

If the interval until deactivation is greater than three minutes, the "Power today" chart appears after three minutes of inactivity. The Sunny Beam displays the "Power today" chart until the display is deactivated after the remaining specified interval has expired.

1. Select **Settings > Display options > Display off after**.
2. Set the interval. Tip: The shorter the interval, the smaller the amount of energy consumed by the Sunny Beam.
3. To have the display always switched on, select - - -.

6.5 Adjusting the Repetition of the Signal Tone for Errors

The Sunny Beam uses a signal tone to inform you of errors. The signal tone is repeated until you press the control button, however, not for more than 24 hours. Repetition takes place after 30 minutes by default.

1. Select **Settings > Alerts**.
2. Select **Signal tone**
   ☑ Signal tone can be heard.
3. Set the desired interval after which the signal tone is to be repeated.
4. To disable the signal tone for errors, select - - - .

6.6 Formats and Units

6.6.1 Changing the Date Format

1. Select **Settings > Country settings > Formats > Date format.**
2. Set the desired date format.

6.6.2 Changing the Timestamp Format

Possible settings:

12h format (e.g. 6:00pm), 24h format (e.g. 18:00)

1. Select **Settings > Country settings > Formats > Time format.**
2. Set the desired time format.

6.6.3 Changing the Format of the Decimal Separator

You can change the format of the decimal separator that is used in the chart views and CSV files. The decimal separator in the power and energy display is always a point and cannot be changed.

1. Select **Settings > Country settings > Formats > Decimal separator**.
2. Set the desired decimal separator.

6.6.4 Changing the Currency

1. Select **Settings > Country settings > Currency**.
2. Set the desired currency.

6.6.5 Changing the Weight Unit of the CO_2 Avoidance

1. Select **Settings > Country settings > CO_2 avoidance**.
2. Set the desired unit.

6.7 Time Settings

6.7.1 Changing the Time Settings After Sunset

If you use the PV inverter, change the time settings (date, daylight saving time, time, time zone) of the Sunny Beam only after the sun has set if possible. The PV inverters no longer feed in after the sunset. The time difference therefore has no affect on the charts on the display of the Sunny Beam.

6.7.2 Changing the Date

1. Select **Settings > Date & Time**.
2. Select **Date** and set the desired date.

6.7.3 Changing the Time

1. Select **Settings > Date & Time.**
2. Select **Time** and set the desired time.

6.7.4 Changing the Time Zone

1. Select **Settings > Date & Time**.
2. Select the previously configured time zone.
3. Set the desired time zone.

6.7.5 Switching Daylight Saving Time On/Off

Using the Sunny Beam, you can switch daylight saving time on or off for the devices of your plant.

1. Select **Settings > Date & Time**.
2. To switch on daylight saving time, activate the selection field "Daylight saving time".
3. To switch off daylight saving time, deactivate the selection field "Daylight saving time".

6.8 Changing the Country

If you change the country, the settings in the menu are automatically adjusted to the selected country. If desired, you can manually change the settings in the menu.

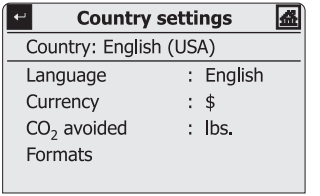


Figure 12: "Country settings" menu (example)

1. Select **Settings > Country settings > Country**.
2. Set the desired country.

6.9 Changing the Language

1. If an unknown language is configured:
   - Press and hold the control button for approximately 10 seconds until the SMA logo appears on the display.
   - Set the desired language.
   - Select [>>].
   - Select [Main menu].
2. If a known language is configured:
   - Select **Settings > Country settings > Language.**
   - Set the desired language.

6.10 Repeating the Plant Search/Requesting Data

When performing a new plant search, all existing data, CSV files, and settings in the Sunny Beam are stored.

1. Set up the Sunny Beam at its intended installation location.
2. Select **Settings > PV plant > New plant search**.
3. Select [Search now].
   ☑ The plant search will start.
   ☑ "Plants found" appears. The NetID of your plant is shown.
   ✖ Is the NetID of your plant not shown?
   - See section 10.

4. Select your NetID.
   ☑ "Establish connection" appears. Sunny Beam establishes a connection to the inverters and device with repeater function* .
   ☑ "Devices found" appears. The serial numbers of all your inverters are listed.
   ✖ Are not all of your inverters listed or are other inverters listed?
   • See section 10.
5. If the plant consists of more than 12 inverters, select 12 inverters that are to be managed by the Sunny Beam. For this purpose, deactivate the selection fields of the inverters that are not to be managed by the Sunny Beam.
6. Select [OK].
   ☑ "Data administration" appears.
7. Choose whether the Sunny Beam is to request all data from the inverters again or not:
   – To request all data from the inverters again, activate the selection field. Tip: Only use this function if there are data missing in the Sunny Beam or the data are incorrect. For redetection, only the data from the last 20 years are detected.
   – In order not to request all the data again, select [>>].
   ☑ "Establish connection" appears. Sunny Beam establishes a connection to the inverters and devices with repeater function and requests data. If you request all the data again, this process can take several minutes depending on the amount of data.
   ☑ "Connected devices" appears. Inverters and devices with repeater function** ( ) are listed. All devices are marked with a checkmark.
   ✖ Are not all devices marked with a checkmark?
   • See section 10.

* SMA *Bluetooth* Repeater, SMA *Bluetooth* Repeater Outdoor, SMA Power Injector with *Bluetooth*

** SMA *Bluetooth* Repeater, SMA *Bluetooth* Repeater Outdoor, SMA Power Injector with *Bluetooth*

8. Select [OK].
   ☑ "Time zone" appears.
9. To change the time zone, select the configured time zone and set the desired time zone.
10. Select [>>].
    ☑ "Time and date" appears.
11. To change the time settings (date, daylight saving time, time, time zone) of the plant, adjust the settings as desired.

Inverters with SMA *Bluetooth* Piggy-Back

The Sunny Beam transmits the time settings to the inverter. If you change the values for the time settings and reset the time as a result, the data for this time difference are deleted in inverters with SMA *Bluetooth* Piggy-. . . . . be reset if you change the settings for the time zone or daylight saving time.

12. Select [>>].
    ☑ "Plant power" appears.
13. Select **Plant power in kWp** and set the plant power of the plant in kWp.
14. Select [>>].

☑ "Power today" appears. Sunny Beam is put into operation.

6.11 Changing the Plant Password

If you have changed the plant password for "User" after commissioning the Sunny Beam, you must adjust the plant password in the Sunny Beam to the modified plant password. As a result, the Sunny Beam can request the data of the inverter again.

Requirement:

☐ All inverters feed in.

Explanation of the Symbols in the "Connected Devices" Menu

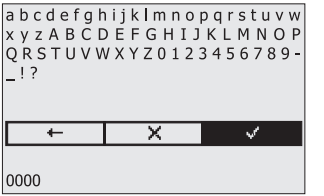
Figure 13: "Connected devices" menu (example)

Symbol	Explanation
✓	Inverter has the same plant password as the Sunny Beam
🔒	Inverter has a different password than the Sunny Beam

Symbol	Explanation
	Sunny Beam has a connection to this device: • SMA *Bluetooth* Repeater • SMA *Bluetooth* Repeater Outdoor • SMA Power Injector with *Bluetooth*
	Sunny Beam checks the connection status and the plant password of this device
	Sunny Beam is not connected to this device

1. Select **Settings > PV plant > Connected devices**.
   ☑ "Connected devices" appears:

2. Select [Plant password].
   ☑ The input page appears:



3. Select the arrow [←] until the previous plant password at the bottom of the screen.

4. Turn the control button until the desired character has been highlighted.
5. Press the button.
   ☑ The selected character is shown at the bottom of the display.
6. Repeat the last two steps until the desired plant password has been entered.
7. To cancel the entry, select the cross [✕].
8. Select the checkmark [✓]. In this way, you save the entered plant password.

☑ "Connected devices" appears.

6.12 Changing the Data Query Frequency

You can change the frequency at which the Sunny Beam is to query data from the inverters. For frequent data queries, the Sunny Beam reports the inverter error more quickly. The default setting is one hour.

1. Select **Settings > Data query > Data query every**.
2. Set the frequency. Tip: The less frequent the data query, the smaller the amount of energy consumed by the Sunny Beam. One query per hour is sufficient. The data is cached in the inverter.

6.13 Checking the Connection Quality

You can view the connection quality of the Sunny Beam for the device with which the Sunny Beam is directly connected to the plant. Using this device, the Sunny Beam initiates the establishment of the *Bluetooth* network in the plant.

Very high energy consumption

As long as the "Connection quality" menu is open, the Sunny Beam checks the connection without interruption. The energy consumption of the Sunny Beam is very high during this time.

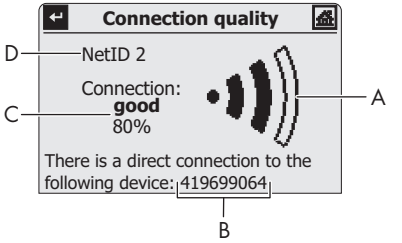


Figure 14: "Connection quality" menu (example)

Position	Symbol	Significance
A		Connection quality is very good
		Connection quality is good
		Connection quality is unreliable
		Connection quality is critical
		No connection
B		Serial number or name of the connected device
C		Connection quality stated in words and as a percentage
D		NetID of the plant

1. Select **Service > Diagnostics > Connection quality**.
2. Read connection quality under "Connection".

   ☑ Connection quality is at least "good".

   ✖ Connection quality is not at least "good"?

   - See section 10.

6.14 Accessing Device Information

The device information contains the following information about the following devices:

Device	Information
• Sunny Beam	Serial number, firmware version, hardware, *Bluetooth* version, battery status (in V and mA), NetID
• Inverter	Type, serial number, software package of the inverter with integrated *Bluetooth* or the SMA *Bluetooth* Piggy-Back
• SMA *Bluetooth* Repeater • SMA *Bluetooth* Repeater Outdoor • SMA Power Injector with *Bluetooth*	Type, serial number, software package

1. Select **Service > Diagnostics > Device information**.
2. To access data on the Sunny Beam, select **Sunny Beam**.
3. To access information on an inverter, select the name of the inverter.

6.15 Performing an Update

When the Sunny Beam is updated, all the settings and data will be saved.

Requirement:

☐ Operating system of the computer is supported by the Sunny Beam (see section 11).

Required Material:

- Computer with internal connection (the required Sunny Beam update file is available online)
- USB connecting cable

1. Download the update file "BEAM-x.xx.upd* " from the download area at www.SMA-America.com and store it on your computer.
2. In the Sunny Beam, select **Service > Update**.
3. Connect the Sunny Beam to the computer using the USB connection cable.
   ☑ Sunny Beam updates the files. The computer detects the Sunny Beam like a removable media device. For this purpose, the "SBEAM" and "UPDATE" drives are added to the computer.
   ☑ On the computer, a window appears containing the "UPDATE" folder.
   ✖ Does no window containing the "UPDATE" folder appear on your computer?
   - If the operating system of the computer is Windows XP/Windows 2000, open My Computer and open the "UPDATE" drive.
   - If the operating system of the computer is Windows Vista, select **Start > My Computer** and open the "UPDATE".
4. Open the "UPDATE" folder.
5. If there is already a file in the "UPDATE" folder, delete this file.

* x.xx stands for the version of the update file.

6. Copy the "BEAM-x.xx.upd" file into the "UPDATE" folder.
7. In the Sunny Beam, select [OK].
   ☑ The message opens if the Sunny Beam is to be updated now.
8. In the Sunny Beam, select [Yes].
   ☑ Update starts.
   ☑ "Power today" appears.
9. Access device information (see section 6.14 "Accessing Device Information", page 65) and compare the firmware version of the Sunny Beam with the firmware version stated in the download area.
10. Remove the Sunny Beam using the "Safely Remove Hardware" icon in the task bar of the computer.
11. Unplug the USB connection cable from the computer and the Sunny Beam.

☑ Update is completed.

6.16 Restoring Factory Setting

If you wish to restore the factory setting of the Sunny Beam, the plant data, CSV files, and personal settings stored in the Sunny Beam will be deleted. Restoring the factory setting can take several minutes.

1. Select **Service > Factory setting**.
2. Select [Yes].
   ☑ Restoring the factory setting.

☑ The display switches off. The factory setting is restored.

7 Device Replacement/Plant Extension (Installer)

7.1 Device Replacement

7.1.1 Replacing Inverters in the Plant

Procedure		See
1	Note the total energy value of the previous inverter: • For inverters with a display, read the total energy value (E-Total) of the inverter on its display. • For inverters without a display, detect plants with Sunny Explorer and read the total energy value of the inverter in the Sunny Explorer.	Inverter installation manual or Sunny Explorer help
2	Decommission the previous inverters.	Inverter installation manual
3	For a new inverter, set the NetID of the plant: • For inverters with integrated *Bluetooth*, set the NetID in the inverter. • For inverters with retrofitted SMA *Bluetooth* Piggy-Back, set the NetID at the fitted SMA *Bluetooth* Piggy-Back.	Inverter installation manual or SMA *Bluetooth* Piggy-Back
4	Commission the new inverters.	Inverter installation manual
5	For new inverters, use Sunny Explorer to set the plant passwords* of the plant.	Sunny Explorer help

Procedure		See
6	For new inverters, use Sunny Explorer to set the total energy value (E-Total) of the previous inverter.	Sunny Explorer help
7	Repeat the plant search in the Sunny Beam.	Section 6.10
8	In the Sunny Beam, set the revenue per kWh for new inverters.	Section 7.2.3

* Plant passwords of the user groups "User" and "Installer"

7.1.2 Replacing the SMA *Bluetooth* Repeater in the Plant

Procedure		See
1	Decommission the previous SMA *Bluetooth* Repeater.	SMA *Bluetooth* Repeater installation manual
2	Commission the new SMA *Bluetooth* Repeater. For this purpose, set the NetID of the plant for the new SMA *Bluetooth* Repeater.	SMA *Bluetooth* Repeater installation manual
3	Repeat the plant search in the Sunny Beam.	Section 6.10

7.1.3 Adjusting the Energy Meter of an Inverter

The energy meter (total energy value) of an inverter must be adjusted in the inverter in the event of an inverter replacement by the installer. Otherwise, an incorrect total energy value (E-Total) will be displayed (e.g. for the Sunny WebBox, on large displays, in the Sunny Portal).

If the energy meter in the inverter is not adjusted, you can adjust the value shown in the Sunny Beam. This adjustment only affects the data of the Sunny Beam, not the inverter. Set the total energy value (E-Total) of the previous inverter in the Sunny Beam for the new inverters. You can determine the total energy value of the previous inverter from the CSV files (see section 5.7).

1. Select **Settings > PV plant > Offset energy meter**.
2. Select the new inverter.
3. Select **Display**.
4. Set the total energy value of the previous inverter.

7.2 Plant Extension

7.2.1 Adding Inverters to the Plant

Procedure		See
1	For a new inverter, set the NetID of the plant: • For inverters with integrated *Bluetooth*, set the NetID in the inverter. • For inverters with retrofitted SMA *Bluetooth* Piggy-Back, set the NetID at the fitted SMA *Bluetooth* Piggy-Back.	Inverter installation manual or SMA *Bluetooth* Piggy-Back
2	Commission the new inverters.	Inverter installation manual
3	For new inverters, use Sunny Explorer to set the plant passwords* of the plant.	Sunny Explorer help
4	Repeat the plant search in the Sunny Beam.	Section 6.10
5	In the Sunny Beam, set the revenue per kWh for new inverters.	Section 7.2.3

* Plant passwords of the user groups "User" and "Installer"

7.2.2 Adding the SMA *Bluetooth* Repeater to the Plant

Procedure		See
1	Commission the SMA *Bluetooth* Repeater. For this purpose, set the NetID of the plant for the SMA *Bluetooth* Repeater.	SMA *Bluetooth* Repeater installation manual
2	Commission the plant.	Inverter installation manual
3	Repeat the plant search in the Sunny Beam.	Section 6.10

7.2.3 Setting the Revenue per kWh

The revenue per kWh is the amount that you receive for each kWh fed into the power distribution grid. The revenue is legally regulated. The Sunny Beam requires the amount in order to calculate the revenue. If you retrofit inverters, a different revenue may apply for these inverters. You can therefore set different revenues for inverters in the Sunny Beam. The default setting is the value 0.45.

1. Select **Settings > Display options > Balance factors > Revenue/kWh**.
2. To change the factor for all inverters, select **Complete plant**.
3. To change the factor for specific inverters, select the desired inverter.
4. Set the factor.

8 Maintenance and Care

8.1 Maintenance

8.1.1 Charging the Batteries

You must charge the batteries of the Sunny Beam in the following cases:

- Message on the display that the state of charge of the batteries is too low.
- The display does not switch on, although the batteries are correctly inserted.

You have three options for charging the batteries:

- Place the Sunny Beam in a location with a lot of daylight. As a result, the Sunny Beam charges the batteries using its integrated PV cell.
- Using the USB connection cable, connect the Sunny Beam to a computer that is switched on or a USB hub with its own power supply. To disconnect the Sunny Boy from the computer again:
  - Remove the Sunny Beam using the "Safely Remove Hardware" icon in the task bar of the computer.
  - Unplug the USB connection cable from the computer and the Sunny Beam.
- Using a USB plug-in power supply, connect the Sunny Beam to a socket-outlet.

During the charging process, the Sunny Beam displays the animated battery symbol until the batteries are fully charged.

8.1.2 Replacing the Rechargeable Batteries

The batteries must be replaced if they are no longer charging properly and this adversely affects the operation of the Sunny Beam.

NOTICE

Damage to Sunny Beam caused by leaking batteries

Batteries of the wrong type may leak into the Sunny Beam and damage the device.

- Do not use any batteries.
- You must only use rechargeable nickel-metal hydride batteries (NiMH), type Mignon (AA) with low self discharge, e.g. Eneloop batteries (see section 12 "Accessories", page 89).

Damage to the Sunny Beam due to batteries with different states of charge

- Batteries with different states of charge may damage the Sunny Beam. Use and replace the rechargeable batteries in pairs.

1. Open the underside of the battery compartment.
2. Remove the batteries.
3. Insert new rechargeable batteries into the battery compartment. For this purpose, observe the marking in the battery compartment.
4. Close the battery compartment.
   ☑ The Sunny Beam requests the time settings of the plant.
   ☑ "Time and date" appears.

5. To change the time settings (date, daylight saving time, time, time zone) of the plant, adjust the settings as desired.

Inverters with SMA *Bluetooth* Piggy-Back

The Sunny Beam transmits the time settings to the inverter. If you change the values of the time settings and therefore reset the time, the data for this time difference are deleted for inverters with a fitted SMA *Bluetooth* Piggy-Back. Please note that the time may also be reset if you change the settings for the time zone or daylight saving time.

8.2 Cleaning the Sunny Beam

NOTICE

Damage to the Sunny Beam due to ingress of liquids.

The Sunny Beam is not waterproof.

- To clean use only a lightly dampened, soft cloth.
- Do not use aggressive or corrosive cleaning agents.

9 Decommissioning

9.1 Decommissioning the Sunny Beam

1. Open the underside of the battery compartment.
2. Remove the batteries.
3. Close the battery compartment.

9.2 Disposing of the Batteries

You must dispose of the rechargeable batteries when they no longer charge properly and this affects the Sunny Beam. You can order new batteries for the Sunny Beam from SMA (see Chapter 12).

- Dispose of batteries according to the disposal regulations which apply at the installation location.

9.3 Disposing of the Sunny Beam

- To dispose of the Sunny Beam at the installation location, observe the disposal regulations which apply at the installation location.
- To have SMA dispose of the Sunny Beam, send the Sunny Beam back to SMA at your own cost, labeled "FOR DISPOSAL".

10 Troubleshooting

Problem	Cause	Rectification
Sunny Beam does not list the NetID of your plant	In your plant, no device is within the radio range of the Sunny Beam.	• Place the Sunny Beam closer to a device of your plant. If this is not possible, use the SMA *Bluetooth* Repeater to bridge the dead zone.
	Devices of your plant are not in operation.	• Commission the devices.
	The NetID 0 (*Bluetooth* off) is set for the devices.	• Set the NetID of your plant for the devices.

Problem	Cause	Rectification
Sunny Beam does not list all inverters of your plant	Sunny Beam has completed the plant search before all devices were connected to one another. For plants with many devices, it may take several minutes until all devices are connected to one another.	• Repeat plant search.
	Not all devices are connected to one another. The wireless connection of several devices may be disturbed by ambient conditions.	• Check the connection quality of the devices (see the respective manual). The connection quality of each device must be at least "good". If required, SMA *Bluetooth* Repeater or SMA *Bluetooth* Piggy-Back Plus may be used.
	Not all devices are connected to one another. In certain devices, the NetID of your plant may not be set.	• Check whether the NetID of your plant is set in the devices.
	Inverters with retrofitted SMA *Bluetooth* Piggy-Back shut down overnight. Therefore, the Sunny Beam cannot establish a connection to these inverters at night.	As soon as the inverters switch on in the morning, the Sunny Beam is able to establish a connection to them.

Problem	Cause	Rectification
The Sunny Beam lists your inverters as well as other inverters from other plants.	A different *Bluetooth* plant within the radio range of the Sunny Beam uses the same NetID as your *Bluetooth* plant.	• Detect a free NetID for your plant using Sunny Explorer (see Sunny Explorer help). • Set the NetID of your plant for all devices of the plant (except for Sunny Beam and Sunny Explorer).
Connection quality of the Sunny Beam is not at least "good"	Sunny Beam is too far away from the plant or the wireless connection is disturbed. The cause of the interference could be walls or ceilings that excessively weaken the waves used for wireless transmission.	• Place the Sunny Beam closer to a device of your plant. If this is not possible, use the SMA *Bluetooth* Repeater or the SMA *Bluetooth* Piggy-Back Plus to bridge the dead zone.

Problem	Cause	Rectification
Some inverters are marked with a lock symbol ( ), others have a checkmark ( )	Different plant passwords are set in the inverters for the user group "User".	• Set the same plant password for "User" in all inverters using the Sunny Explorer (see Sunny Explorer help). • Enter the plant password in the Sunny Beam (see section 6.11).
	A different plant with SMA *Bluetooth* is located within the radio range of the Sunny Beam and uses the same NetID as your plant.	• Detect a free NetID for your plant using Sunny Explorer (see Sunny Explorer help). • Set the NetID of your plant for all devices of the plant (except for Sunny Beam and Sunny Explorer).
	Your plant was retrofitted with an inverter in which the plant password set for the user group "User" is different to that in the Sunny Beam.	• For the new inverter, use the Sunny Explorer to set the plant password configured in your plant for the user group "User". Tip: To access the plant password set in the Sunny Beam, see section 6.11.

Problem	Cause	Rectification
In the "Connected devices" list, inverters are sometimes marked with a cross (✕)	Inverters with SMA *Bluetooth* Piggy-Back: Inverters shut down at night. As the Sunny Beam cannot establish a connection to these inverters, the Sunny Beam displays a cross. As soon as the inverters are switched on in the morning, the cross symbol will disappear.	
	In the meantime, the Sunny Beam cannot establish a connection to these inverters. As soon as the Sunny Beam has established a connection to these inverters again, the cross will disappear.	
Error message: "For the display of a specific annual yield enter the performance of the plant under "Settings > PV plant".	When commissioning the Sunny Beam, no plant power was entered in kWp. Without this value, the Sunny Beam cannot calculate the "Specific annual yield" chart.	• Enter the value for the plant power of your plant in kWp (see section 6.2.4).
The Sunny Beam displays the warning symbol (⚠)	A warning has occurred in an inverter.	• If the warning in the "Events" menu is not shown as terminated or if the warning occurs frequently, contact your installer.

Problem	Cause	Rectification
The Sunny Beam displays the error symbol (⚠)	An error has occurred in an inverter.	• Details about this event (see section 5.6). • Contact your installer and inform him/her about the event message and the serial number of the inverter in which the event occurred.
In the evening, the Sunny Beam displays a warning symbol (ⓘ), then an error symbol (⚠), and the event "Communication disturbed".	Inverters with retrofitted SMA *Bluetooth* Piggy-Back shut down overnight. If you use the Sunny Beam several times during this period and initiate multiple data queries*, the event "Communication disturbed" is shown as connection to these inverters is not possible at night. As soon as the inverters switch on in the morning, the Sunny Beam is able to establish a connection to them.	

* When the "Power today" chart is open, the Sunny Beam queries the current power (Power) and the total energy (E-Total). Sunny Beam hides the value "Power" after 60 seconds, as the value is no longer up to date.

Problem	Cause	Rectification
Signal tone can be heard	An error has occurred in an inverter.	• Details about this event (see section 5.6). • Contact your installer and inform him/her about the event message and the serial number of the inverter in which the event occurred. Tip: If you no longer wish to be informed of errors via a signal tone, you can switch off the signal tone (see section 6.5).
	The state of charge of the batteries is low.	• Charge the batteries in the Sunny Beam (see section 8.1.1).
The display no longer switches on.	The state of charge of the batteries is low.	• Charge the batteries in the Sunny Beam (see section 8.1.1).
	Batteries are not inserted correctly.	• Insert the batteries according to the marking in the battery compartment.

Problem	Cause	Rectification
Computer reports that the USB device can generate greater power	Computer does not have a USB 2.0 port or the Sunny Beam is connected to a USB port that is not supported by USB 2.0. Computer displays the message as the Sunny Beam supports USB 2.0.	Message does not influence the operation of the Sunny Beam. Tip: You can switch off the message. However, this will mean that other USB errors will also no longer be reported. For this purpose, proceed as follows. These steps are for Windows XP and may be different in other operating systems: • Right-click on **My Computer** and select **Device Manager**. • Open the **USB Controller** entry in the Device Manager. • Right-click on **Host Controller**. • Select **Properties**. • Select **Advanced**. • Activate **Do not display USB errors** (enter checkmark).

Problem	Cause	Rectification
Computer reports that the USB device can generate greater power	USB driver of the computer does not support USB 2.0.	There are two options: • Update the USB driver as described in the computer manual. • Install the current Windows service pack for the Windows operating system of the computer.
The computer reports that it is to be restarted	Sunny Beam was connected to this computer for the first time.	No action required. It does not affect the computer or the Sunny Beam if you do not restart the computer.
	An update has been performed for the Sunny Beam.	
Gaps or peaks in the chart view	After commissioning the Sunny Beam, the time in the Sunny Beam was set forward or backwards. This behavior only affects the chart data on the Sunny Beam display, and not the calculated data (total energy, energy today, energy yesterday, etc.).	Tip: Do not unnecessarily change the time settings (date, daylight saving time, time zone) in the Sunny Beam. Only change the time settings in the Sunny Beam when the inverter is no longer feeding in. The time difference therefore has no effect on the charts on the display of the Sunny Beam.
"Power today" chart displays old data	For inverters with SMA *Bluetooth* Piggy-Back: Inverter has not yet switched on.	

Problem	Cause	Rectification
Gray areas in the diagrams	There are data missing from this period, although the plant was in operation at this time.	• Sunny Beam rectifies the problem itself by regularly attempting to request the missing data. As soon as the Sunny Beam can request the missing data, the problem is rectified. • If the problem persists for a longer period of time: Repeat the plant search (see section 6.10). For this purpose, activate the selection field on the "Data administration" page that appears. As a result, the Sunny Beam again requests all data from the inverters.
Gray areas in the diagrams	There are no complete data for the time period, as the plant was only commissioned during this time period.	
	There are no complete data for the time period yet, as the time period has not yet elapsed.	

11 Technical Data

This product meets the applicable Industry Canada technical specifications.

Mechanical Data

Width x Height x Depth	5 in. x 3 in. x 7 3/4 in. (127 mm x 75 mm x 190 mm)
Weight with batteries	12 1/3 oz. (350 g)

Voltage supply

Voltage supply	Rechargeable batteries
Type of battery	Rechargeable nickel-metal hydride batteries (NiMH), type Mignon (AA), 1.2 V DC with low self discharge, e.g. Eneloop*
Number of batteries	2
Battery charging possibilities	Integrated PV cell/USB connection cable and computer/ USB plug-in power supply (accessories)

* For replacement batteries, see section 12 "Accessories", page 89.

Ambient Conditions

Ambient temperature	+32°F ... +104°F (0°C ... +40°C)
Degree of protection	NEMA 1
Installation location	indoors

Communication

Inverter communication	*Bluetooth* Wireless Technology Class 1
Computer communication	USB
Maximum number of devices: Inverters	12
Maximum number of devices: SMA *Bluetooth* Repeater/ SMA *Bluetooth* Repeater Outdoor/ SMA Power Injector with *Bluetooth*	4
Range in open air	Up to 328 ft. (100 m)

Features

Display	LCD
Operation	Rotary switch
Connections	USB
Software language	German/English/Spanish/French/Italian/Greek/ Dutch/Portuguese/Czech
Memory	Ring buffer*
Memory volume	4 MB

* Always contains the last 13 monthly files and 90 daily files.

System Requirements for Connecting to the Computer

Supported operating systems	Windows XP/Windows Vista/Windows 7/Linux (SUSE, RedHat, Ubuntu, Debian etc.) with support for USB and mass storage devices/Mac OS X from 10.3/Mac OS Classic from 8.6 with support for USB devices

12 Accessories

USB plug-in power supply

With the USB plug-in power supply, you can connect the Sunny Beam to a socket-outlet in order to charge the batteries via the power distribution grid rather than the PV cell.

Order number: BEAM-BT-SUPPLY

Replacement batterys

2 replacement batteries for the Sunny Beam.

Order number: BEAM-BT-BATTERY

13 Glossary

Bluetooth Class 1

Bluetooth is available in three classes which differ in transmitting powers and therefore their radio ranges. *Bluetooth* Class1 is the class with the greatest radio range:

Class	Transmitting power	Radio range outdoors
1	100 mW, 20 dBm	~ 100 m
2	2.5 mW, 4 dBm	~ 10 m
3	1 mW, 0 dBm	~ 1 m

NetID

PV plants and small wind turbine systems with SMA *Bluetooth* operating in close proximity to one another are distinguished by their individual NetID. SMA Solar Technology *Bluetooth* devices recognize your *Bluetooth* plant via an assigned NetID. All devices in a PV plant must therefore have the same NetID.

Plant password

All devices that have the same user password and NetID are part of one specific plant. Therefore, any password that is the same for all the devices of a plant is referred to as the plant password by SMA.

SMA *Bluetooth* Repeater

The SMA *Bluetooth* Repeater is used to close dead zones under unfavorable installation conditions between SMA devices with *Bluetooth* Wireless Technology or to improve poor wireless connections.

Sunny Explorer

With the Sunny Explorer software, you can visualize and manage the data of your *Bluetooth* plant. You can also configure individual devices or entire device classes of your *Bluetooth* plant. The connection to the devices is established via *Bluetooth*. The computer must be equipped with *Bluetooth*, i.e. via an integrated *Bluetooth* module or via a *Bluetooth* USB stick.

14 FCC compliance information

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A & B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.
- The user is cautioned that changes or modifications not expressly approved by SMA America, Inc. could void the user's authority to operate this equipment.

15 Contact

If you have technical problems concerning our products, contact the SMA Service Line. We need the following information in order to provide you with the necessary assistance:

- Hardware version of the Sunny Beam (see section 6.14)
- Firmware version of the Sunny Beam (see section 6.14)
- Firmware version of the SMA *Bluetooth* Piggy-Back (if available) in the inverter
- Type, firmware version, and serial number of the inverter

In case you need to send in the Sunny Beam, remove the batteries first. Send the batteries separately.

SMA America, LLC
6020 West Oaks Blvd, Ste 300
Rocklin, CA 95765
Tel. +1 916 625 0870
Tel. +1 877-MY SMA TECH
Tel. +1 877 697 6283 (Toll free, available for USA, Canada and Puerto Rico)
Fax +1 916 625 0871
Service@SMA-America.com
www.SMA-America.com

SMA Solar Technology Canada Inc.
2425 Matheson Blvd. E, 8th Floor
Mississauga, ON L4W 5K5
Canada
Tel. +1 877 506 1756 (Toll free, available for Canada)
Service@SMA-Canada.ca
www.SMA-Canada.ca

SMA Solar Technology

www.SMA-Solar.com

SMA America, LLC
www.SMA-America.com

For product and purchase inquiries contact:

ecoDIRECT
CLEAN ENERGY SOLUTIONS
www.ecodirect.com